

WO 03/064663

PCT/DE02/03958

25

AMENDED CLAIMS

[received by the International Office on May 07, 2003 (05/07/03);
original claims 1-47 replaced by amended claims 1-48 (9 pages)]

Claims

1. A method for reducing undesirable bending vibrations in at least one rotating cylinder (01) of a processing machine, having at least one actuator (10, 11), which can be charged with signals (S), by means of which undesirable vibrations are counteracted, in that the actuator (10, 11) acts on a portion of a journal (07, 08) of the cylinder (01), characterized in that the actuator (10, 11) acts on a portion of the journal (07, 08) located on a side of the bearing (04, 06) facing away from the rotating component (01, 18), so that the bearing (04, 06) acts as the nip for a bending or lever stress, and that a required sequence of signals (S) and/or their strength is predicted as a function of the angle of rotation position (Φ) of the cylinder (01, 18), and actuator (10, 11) is charged with it as a function of the angle of rotation position (Φ).

2. The method in accordance with claim 1, characterized in that the signal (S) contains the strength and the direction of a counterforce, which is to be applied by the actuator (10, 11) or to be changed by it.

3. The method in accordance with claim 1, characterized in that the signal (S) contains the size and the direction of a required actuating path.

4. The method in accordance with claim 1, characterized in that in the course of a stationary operating situation the actuator (10, 11) is charged with the predicted sequence or strength during periodic repetitions.

5. A method for reducing undesirable bending vibrations in at least one rotating cylinder (01) of a processing machine, wherein first a course of the undesirable vibration is determined as a function of the angle of rotation position (Φ), and with the aid of this dependency a course of a counterforce to be

impressed or changed is determined as a function of the angle of rotation position (Φ), wherein the course of the vibration and/or of the determined counterforce is stored and predicted in a control and/or memory device (12), and, in the course of a stationary operating situation, the rotating component (01, 18) is charged in periodic repetitions with the signal (S) corresponding to the course of the detected and predicted counterforce, wherein the length of the period corresponds to a full revolution of the rotating component (01, 18) or to a quotient of one revolution and a whole number.

6. The method in accordance with claim 5, characterized in that the rotating component (01, 18) is charged with the counterforce or a change of the counterforce by means of at least one actuator (10, 11).

7. The method in accordance with claim 4 or 6, characterized in that the charging of the actuator (10, 11) takes place during production without a compulsory requirement of the continuous determination of actual values for characterizing the vibration.

8. The method in accordance with claim 1 or 6, characterized in that the actuator (10, 11) acts at least indirectly on a journal (07, 08) of the rotating component (01, 18) seated in a lateral frame (02, 03).

9. The method in accordance with claim 1 or 8, characterized in that a position and/or shape of an axial bending line of at least the journal (07, 08) is changed as a function of the state of the actuator (10, 11).

10. The method in accordance with claim 1 or 8, characterized in that the actuator (10, 11) acts on a portion of the journal (07, 08) located on a side of the bearing (04, 06) facing away from the rotating component (01, 18), and that the

bearing (04, 06) acts as the nip for a bending or lever stress.

11. The method in accordance with claim 1 or 8, characterized in that, as a function of its state, the actuator (10, 11) changes the position of the journal (07, 08) in a plane perpendicularly in respect to the axis of rotation of the rotating component (01, 18).

12. A method for reducing undesirable bending vibrations in at least one rotating cylinder (01, 18) of a processing machine, which is rotatably seated in bearings (04, 06) by means of journals (07, 08) at both ends, characterized in that a shape of an axial bending line of at least the journal (07, 08) is changed by means of an actuator (10, 11) acting on at least one of the journals (07, 08), in that, for generating or changing a counterforce, the actuator (10, 11) is charged with a signal (S), which is a function of an angle of rotation position (Φ) of the cylinder (01, 18), wherein the course of the signal (S) is predicted as a function of the angle of rotation position (Φ) of the cylinder (01, 18).

13. The method in accordance with claim 12, characterized in that the actuator (10, 11) acts on the journal (07, 08) with at least one component in the radial direction.

14. The method in accordance with claim 10 or 12, characterized in that the actuator (10, 11) acts on the journal (07, 08) at least indirectly at a distance (a) to the center of

the bearing (04, 06) of 100 to 230 mm.

15. The method in accordance with claim 10 or 12, characterized in that the actuator (10, 11) acts on a bearing (16, 17) receiving the journal (07, 08), whose center has a distance (a) in the axial direction of 100 to 230 mm from the center of the bearing (04, 06).

16. The method in accordance with claim 14 or 15,

characterized in that, with a diameter of the journal (07, 08) of 55 to 65 mm, the actuator (10, 11) acts on the journal (07, 08) at a distance (a) of 125 to 175 mm.

17. The method in accordance with claim 14 or 15, characterized in that, with a diameter of the journal (07, 08) of 65 to 75 mm, the actuator (10, 11) acts on the journal (07, 08) at a distance (a) of 150 to 230 mm.

18. The method in accordance with claim 12, characterized in that the actuator (10, 11) acts on a portion of the journal (07, 08) on the side of the bearing (04, 06) facing away from the rotating component (01, 18).

19. The method in accordance with claim 12, characterized in that the actuator (10, 11) is periodically charged with the signal (S).

20. The method in accordance with claim 4, 5 or 14, characterized in that the length of the period corresponds to a full revolution of the rotating component (01, 18) or to a quotient of one revolution and a whole number.

21. The method in accordance with claim 2, 5 or 12, characterized in that the counterforce, or its change, are applied as a discrete pulse or several discrete pulses.

22. The method in accordance with claim 2, 5 or 12, characterized in that the counterforce, or its change, are applied as a function which extends continuously within a period.

23. The method in accordance with claim 2, 5 or 12, characterized in that a relief of an existing pre-stress takes place for changing the counterforce by means of the signal (S).

24. The method in accordance with claim 2, 3, 5 or 12, characterized in that the counterforce and/or the actuating path are directly correlated with the angle of rotation position (Φ).

25. The method in accordance with claim 4 or 12, characterized in that the predicted dependency is determined in that first a course of the undesirable vibration is determined as a function of the angle of rotation position (Φ) of the rotating component (01, 18), that with the aid of this dependency a course for the counterforce is determined, which is a function of the angle of rotation position (Φ), and the course of the vibration and/or of the determined counterforce is stored in a control and/or memory device.

26. The method in accordance with claim 5 or 25, characterized in that the undesirable course of the vibration is determined by means of a sensor.

27. The method in accordance with claim 25, characterized in that the actuator (10, 11) is used as the sensor, and vice versa.

28. The method in accordance with claim 1, 6, 12 or 26, characterized in that a piezo element (10, 11) is used as the actuator (10, 11) or sensor.

29. A method for reducing undesirable bending vibrations in at least one cylinder (01) of a processing machine, wherein an

undesirable vibration is counteracted in that a changeable force is applied, characterized in that at least one journal (04, 06) of the rotating component (01, 18) is definitely charged with a force pulse at least once per revolution, or that a pre-stress is definitely relieved, and only one external excitation, in particular in the form of a force pulse or a relief, is impressed per revolution for each obstruction (09, 19) arranged in the

circumferential direction on the rotating component (01, 18).

30. A method for reducing undesirable bending vibrations in at least one cylinder (01) of a processing machine, wherein an undesirable vibration is counteracted in that a changeable force is applied, characterized in that at least one journal (04, 06) of the rotating component (01, 18) is definitely charged with a force pulse at least once per revolution, or that a pre-stress is definitely relieved, and that the shape and/or duration of the impressed force pulse or of the relief is related to an excitation caused by the rolling-off of an obstruction (09, 19) on the circumference of the cylinder (01, 18) on a second cylinder (18, 01).

31. The method in accordance with claim 29 or 30, characterized in that the journal (07, 08) is charged with a force pulse or relief applied from the outside in addition to the forces created by the vibration or the pulses causing the vibration.

32. The method in accordance with claim 30, characterized in that only an external excitation, in particular in the form of a force pulse or a relief, is impressed per revolution for each obstruction (09, 19) arranged in the circumferential direction on the rotating component (01, 18).

33. The method in accordance with claim 29, characterized in that the shape and/or duration of the impressed force pulse or of the relief is related to an excitation caused by the rolling-

WO 03/064663

PCT/DE02/03958

off of an obstruction (09, 19) on the circumference of the
cylinder (01, 18) on a second cylinder (18, 01).

34. The method in accordance with claim 29 or 30, characterized in that the force pulse or the relief is impressed on the journal (04, 06) on a side of the bearing (04, 06) receiving the journal (04, 06), which faces away from the cylinder (01, 18).

35. The device for executing the method in accordance with claim 1, 5, 12, 29 or 30, characterized in that the rotating component (01, 18) is embodied as the cylinder (01) of a printing press.

36. The device for executing the method in accordance with claim 1, 5, 12, 29 or 30, characterized in that the rotating component (01, 18) is embodied as the cylinder (01) of a processing machine for web-shaped materials.

37. A device for reducing undesirable bending vibrations in at least one rotating component (01, 18) of a processing machine, which is rotatably seated in bearings (04, 06) by means of journals (07, 08) at both ends, having at least one actuator (10, 11) by means of which undesirable vibrations are counteracted, wherein the actuator (10, 11) acts on a part of the journal (07, 08) located on a side of the bearing (04, 06) facing away from the rotating component (01, 18), characterized in that the actuator (10, 11) acts on a bearing (16, 17) receiving the journal (07, 08), whose center has a distance (a) in the axial direction of 100 to 230 mm from the center of the bearing (04, 06).

38. The device in accordance with claim 37, characterized in that the journal (07, 08) is periodically charged with a force pulse of maximally 5 to 15 kN via the bearing (16, 17).

39. The device in accordance with claim 37, characterized in that the journal (07, 08) is charged with a prestress of 5 to

15 kN via the bearing (16, 17) and is periodically relieved.

40. The device in accordance with claim 37, characterized in that the rotating component (01, 18) has a ratio between a length (L01) and a diameter (D01) of its barrel, which lies between 11 and 7.

41. The device in accordance with claim 37, characterized in that the rotating component (01, 18) is embodied as a cylinder (01) of a printing press.

42. The device in accordance with claim 37, characterized in that the rotating component (01, 18) embodied as a cylinder (01) of a printing press acts together with at least one second cylinder (18) as the first pair in a print-on position.

43. The device in accordance with claim 42, characterized in that only one of the two cylinders (01, 18) has an actuator (10, 11) which can be charged with the signal (S).

44. The device in accordance with claim 42, characterized in that two pairs with a total of four cylinders (01, 18) constitute a double print position between the cylinders (18) located on the inside, and that only the two outside located cylinders (01) have an actuator (10, 11), which can be charged with a signal (S).

45. The device in accordance with claim 42, characterized in that two pairs with a total of four cylinders (01, 18) constitute a double print position between the cylinders (18) located on the inside, and that only the two cylinders (18) constituting the print position have an actuator (10, 11), which can be charged with a signal (S).

46. The device in accordance with claim 42, characterized in that two pairs with a total of four cylinders (01, 18) constitute a double print position between the cylinders (18) located on the inside, and that an inside located and an outside located cylinder (01, 18) has an actuator (10, 11), which can be charged with a signal (S).

47. The device in accordance with claim 42, characterized in that two pairs with a total of four cylinders (01, 18) constitute a double print position between the cylinders (01) located on the inside, and that only one of the two cylinders (01) constituting the print position has an actuator (10, 11), which can be charged with a signal (S).

48. The device in accordance with claim 42, characterized in that two pairs with a total of four cylinders (01, 18) constitute a double print position between the cylinders (18) located on the inside, and that all four cylinders (01, 18) have an actuator (10, 11), each of which can be charged with a signal (S).